

CLAIMS

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1 1. A method for improving throughput in continuous electrodialysis processes, the method comprising automatically controlling the pH of acid loop solutions in strong acid/weak base configurations and of base-loop solutions in weak acid/strong base configurations.

1 2. The method as recited in claim 1 wherein the process involves the formation of an acidic solution in an electrodialysis stack and a buffer is added to the solution.

1 3. The method as recited in claim 1 wherein the process involves the formation of a basic solution and a buffer is added to the solution.

1 4. The method as recited in claim 1 wherein a buffer is added to the solution and is regenerated continuously and external to the stack.

1 5. The method as recited in claim 4 wherein the buffering agent is premixed
2 with a solution situated remotely from the stack.

1 6. The method as recited in claim 1 wherein a buffering agent is added at
2 ambient temperature.

1 7. The method as recited in claim 1 wherein the electrodialysis process
2 operates at a temperature which ranges from about 15°C to 40°C.

1 8. The method as recited in claim 4 wherein the concentrations of the
2 anionic and cationic moieties of the buffer are dependent upon the desired pH.

1 9. The method as recited in claim 8 wherein the anionic and cationic
2 moieties are added to the ED system as solids, liquids, gases, solutions or any combi-
3 nation thereof.

1 10. The method as recited in claim 1 wherein for an electrodialysis solution
2 that will become acidic, a buffer pair is created by adding an acid and a metal hydroxide
3 to the "acid-loop" stream.

1 11. The method as recited in claim 1 wherein for an electrodialysis solution
2 that is already acidic, a buffer pair is created by adding a metal salt of the acid's
3 conjugate base to the "acid-loop" stream.

1 12. The method as recited in claim 1 wherein for an electrodialysis solution
2 that will become basic, a buffer pair is created by the addition of a base and its conju-
3 gate acid to the "base-loop" stream.

1 13. The method as recited in claim 1 wherein for an electrodialysis solution
2 that is already basic, a buffer pair is created by the addition of an acid to the "base-
3 loop" stream that contains, as its conjugate base, the base present in the ED electrolyte
4 solution.

1 14. A process for maintaining the condition of electrodialysis membranes in
2 electrodialysis cell compartments, the process comprising controlling the pH in an acid-
3 loop or base-loop solution created by the electrodialysis cell in operation within two pH
4 units.

1 15. The process as recited in claim 14 wherein a buffer solution is a means of
2 maintaining the pH of the ED acid solution at a desired level.

1 16. The method as recited in claim 15 wherein the buffer solution is supplied to
2 the cell compartments via a tank external to the cell compartments.

1 17. The method as recited in claim 14 wherein controlling the pH in the acid-
2 loop is a means of protecting bipolar membranes and their active sites.

1 18. The process as recited in claim 15 wherein the buffering solution is added
2 at ambient temperature.

1 19. The method as recited in claim 14 wherein the electrodialysis cell
2 operates at a temperature which ranges from about 15°C to 40°C.

1 20. The method as recited in claim 14 wherein a buffer solution is added to
2 maintain the pH of solutions to within 2 pH units of a desired pH.